

# ELEG 5663 Communication Theory Course Syllabus

**General Information:** Instructor: Jingxian Wu Office: Bell 3168  
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Office Hour: Tu. 12:30-1:30

**Required Material:**

- Textbook: “Digital Communications: Fundamentals and Applications”, 2<sup>nd</sup> Ed., Bernard Sklar, Prentice Hall, 2001.
- Software: Matlab with Signal Processing Toolbox

**Reference:** “Digital Communications,” 5<sup>th</sup> Ed., John Proakis, McGraw-Hill, 2007. (Optional)

**Prerequisites:** Signal and System, Probability and Random Process

- Familiar with Matlab Programming
- Knowledge of linear time invariant system, Fourier series and transform, Laplace transform, time domain and frequency domain representation of signals, power spectrum density, and energy spectrum density of deterministic signals
- Knowledge of discrete and continuous random variable, probability mass function, probability density function, moments of random variables, moment generating function
- Knowledge of random process, wide sense stationary random process, auto-correlation function, power spectrum density of random signals
- Knowledge of modulation and demodulation

**Learning Objectives:** To understand the difference of analog and digital communication systems, to understand the operation and theory of digital communication systems, to be able to analyze optimum receivers for various digital modulations in additive white Gaussian noise channel, to understand the theories and practice of channel coding, to be able to implement digital communication systems.

**Grading:**

• Test 1 30%	• A: $90 \leq \text{grade} \leq 100$
• Test 2 30%	• B: $80 \leq \text{grade} < 90$
• Homework 20%	• C: $70 \leq \text{grade} < 80$
• Projects 20%	• D: $60 \leq \text{grade} < 70$
	• F: $0 \leq \text{grade} < 60$

  

- Due dates for homework and lab report will be strictly enforced. Late submission within one week after due date will receive a 20% grade deduction, and no credit if submitted after one week from the due date.
- If for some legitimate reason (sickness, death in the family, etc.), you cannot take an **exam** on the scheduled day, you must notify the instructor **prior to the exam.**

**Online Resources:**

- Course materials (Slides, Homework, Projects, References, etc) can be found at <https://wuj.hosted.uark.edu/teaching/eleg5663/eleg5663>
- Please check course website **at least once per week** for updates.

**Academic  
Honesty:**

Academic honesty is fundamental to the activities of an academic institution and success of students. Any form of copy and plagiarism will not be tolerated in this class. Any kind of activities related to academic dishonesty will be dealt with on a case-by-case basis and may be grounds for dismissal from the class.

**Tentative  
Schedule:**

- Week 1: Signals and Spectra (Ch. 1)
- Week 2: Signals and Spectra (Ch. 1)
- Week 3: Baseband Formatting/Modulation (Ch. 2)
- Week 4: Baseband Formatting/Modulation (Ch. 2)
- Week 5: Baseband Optimum Detection (Ch. 3)
- Week 6: Baseband Optimum Detection (Ch. 3)
- Week 7: Baseband Optimum Detection (Ch. 3)
- Week 8: Bandpass Mod/Demod (Ch. 4)
- Week 9: Bandpass Mod/Demod (Ch. 4)
- Week 10: Communication Link Analysis (Ch. 5)
- Week 11: Communication Link Analysis (Ch. 5)
- Week 12: Channel Coding (Ch. 6)
- Week 13: Channel Coding (Ch. 6)
- Week 14: Coding and Modulation Tradeoff (Ch. 6, Ch. 9)
- Week 15: Coding and Modulation Tradeoff (Ch. 6, Ch. 9)
- Week 16: Review

**Project  
Schedule:**

- Project 1: Random Variable and Random Process
- Project 2: BER of Binary Signaling
- Project 3: Equalization
- Project 4: BER of MQAM
- Project 5: Channel Coding
- Project 6: Coding and Modulation Tradeoff

**The above schedule is subject to change without prior notice.**